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FATTY-ACID EMULSION; A NEW CONTACT SPRAY.

By

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The following account of the preparation and use of a fatty-acid emulsion as a contact spray is issued for the information of entomologists and others who may wish to test it on an experimental basis. The fatty-acid emulsion was developed at the Silver Spring, Maryland, field station of the Bureau of Entomology and has given promising results as a contact insecticide under special conditions. Many points of practical value, however, have not as yet been established and it is therefore hoped that the experiences of other investigators will be of aid in this respect.

The toxic component of the emulsion consists of free or uncombined organic fatty acids of the aliphatic monocarboxylic saturated acid series. It is believed that caprylic, capric, and lauric acids of this series are the most useful for insecticidal purposes.

A commercial mixture of crude lauric acid, known under the trade name of "Double distilled Coconut Fatty Acid" is available in considerable quantity at a comparatively low cost.*

*This may be obtained from Armour Soap Works, Chicago, Illinois. This is the only firm we know at this time in position to furnish the fatty acid in question.

Formula:

Double distilled coconut fatty acid -----	1 gallon
Gasoline (Benzol) -----	1 "
Water -----	2 $\frac{1}{2}$ "
Glue (Granular) -----	2 $\frac{1}{2}$ pounds.

The above formula will give approximately 5 gallons of stock emulsion.

Method of preparing stock emulsion:

First melt the fatty acid and after removing from fire add the benzol gasoline and stir until the solution is homogeneous. Next dissolve the glue in the required amount of hot water. When dissolved, the glue solution should be poured into the fatty acid-gasoline mixture, stirred, and, while still hot, pumped twice at any convenient pressure through a clean spray pump. The stock emulsion should be stored in glass or wood containers, as metal containers may be attacked by the acid.

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The following account of the preparation and use of a fatty acid emulsion as a contact spray is based on the information of entomologists and others who have used it on an experimental basis. The fatty acid emulsion is prepared by the Forest Insect Survey, United States, and has been used in various places as a contact insecticide under special conditions. The fatty acid emulsion, however, has not as yet been tested and it is therefore stated that the experience of other investigators will be of aid in this regard.

The basic component of the emulsion consists of three or more fatty acids of the aliphatic hydrocarbon series and water. It is believed that caprylic, capric, and lauric acids of this series are the most useful for insecticidal purposes.

A commercial mixture of crude fatty acids, known under the trade name of "Fossil Distilled Coconut Fatty Acid" is available in considerable quantity at a comparatively low cost.

The material obtained from Forest Insect Survey, United States, is the only one we have at this time in position to furnish the fatty acid in question.

Formula

Fossil distilled coconut fatty acid 1 gallon
Gasoline (Kerosene) 1 gallon
Water 1 gallon
Salt (Sodium) 1 gallon

The above formula will give approximately 2 gallons of stock emulsion.

Method of preparing stock emulsion

First mix the fatty acid and other materials then add the kerosene and stir well the solution is homogeneous. Next dissolve the salt in the required amount of hot water. Then dissolve the other materials in the fatty acid-kerosene mixture, stir, and, with still hot, poured twice at any convenient moment through a strainer. The stock emulsion should be stored in glass or metal containers, as metal containers may be attacked by the acid.

Dilution:

In the control of apple aphids, use one part by volume of the free fatty acid to 600 to 800 parts of water. Add the water to the stock emulsion and provide suitable agitation. One gallon of the stock emulsion, when used at the suggested rate, will make 120 to 160 gallons of spray solution.

Specifications for other insects are omitted since apple aphids have been the principal subjects of the tests thus far conducted. The fatty acid emulsion, however, is toxic to other species and orders.

Discussion:

Soft water should preferably be used both in the making of the stock emulsion and in spraying.

Benzol gasoline was used to promote hydrolysis, but if this type of gasoline is not available, any straight gasoline product will serve as a solvent for the fatty acid.

The amount of glue may be varied according to conditions, but enough should be used to insure an emulsion sufficiently stable for spray purposes. In cool weather the glue may set, in which case it will be necessary to warm the stock emulsion until it is in a liquid condition when stirred. To avoid setting of the glue, it may be advisable to store the stock emulsion at room temperatures.

In its present form the fatty acid emulsion is not compatible with lime-sulphur solution or Bordeaux mixture, but may be mixed with arsenate of lead and with a finely divided sulphur-glue mixture. Also it may be combined with lubricating oil emulsion or miscible oils and applied when the apple buds show green (delayed dormant application) for the control of the San Jose scale and apple aphids. The addition of fatty-acid emulsion to lubricating oil emulsion apparently serves to increase the spreading qualities of the latter. The required amount of fatty acid should first be placed in the spray tank and diluted with water with agitator running until the tank is about $\frac{3}{4}$ full. The lubricating oil emulsion should then be added and enough water to bring the spray up to the proper dilution.

The fatty-acid emulsion kills by actual contact. Satisfactory results can not be obtained unless the aphids are completely wetted. It is believed that a relatively coarse, driving spray, under good pressure, will give the best control.

